T00E80*0587H66C

FIG. 1

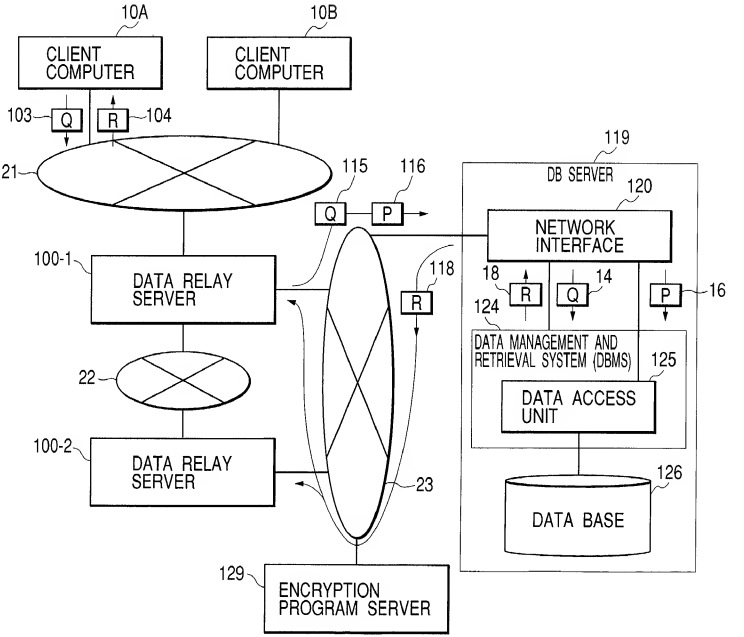

FIG. 2

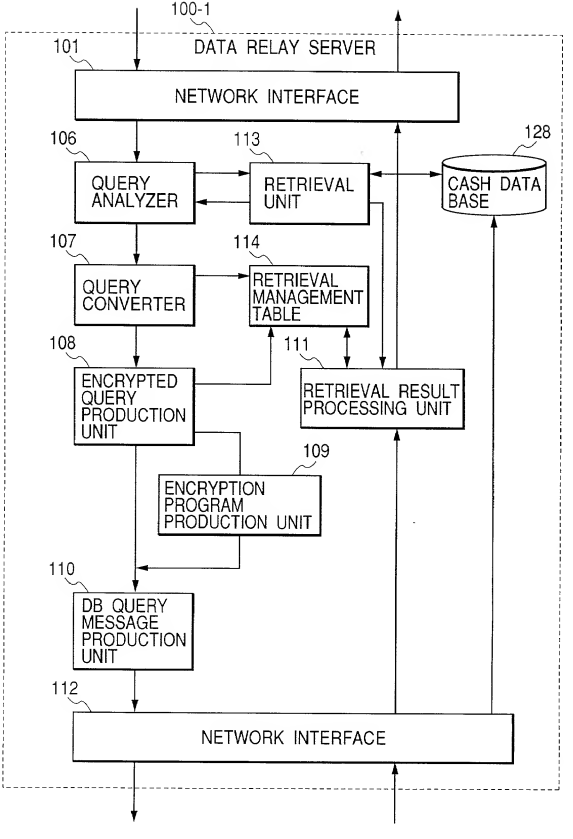
100-1
101
DATA RELAY SERVER
NETWORK INTERFACE
106
QUERY ANALYZER
113
RETRIEVAL UNIT
128
CASH DATA BASE
107
QUERY CONVERTER
114
RETRIEVAL MANAGEMENT TABLE
108
ENCRYPTED QUERY PRODUCTION UNIT
111
RETRIEVAL RESULT PROCESSING UNIT
109
ENCRYPTION PROGRAM PRODUCTION UNIT
110
DB QUERY MESSAGE PRODUCTION UNIT
112
NETWORK INTERFACE

FIG. 3

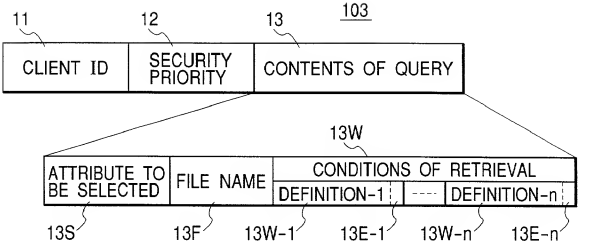

FIG. 4

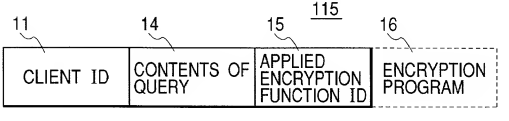

FIG. 5

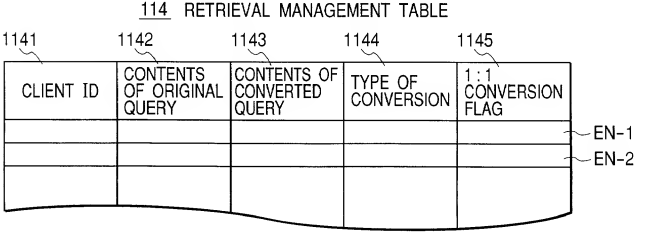

FIG. 6

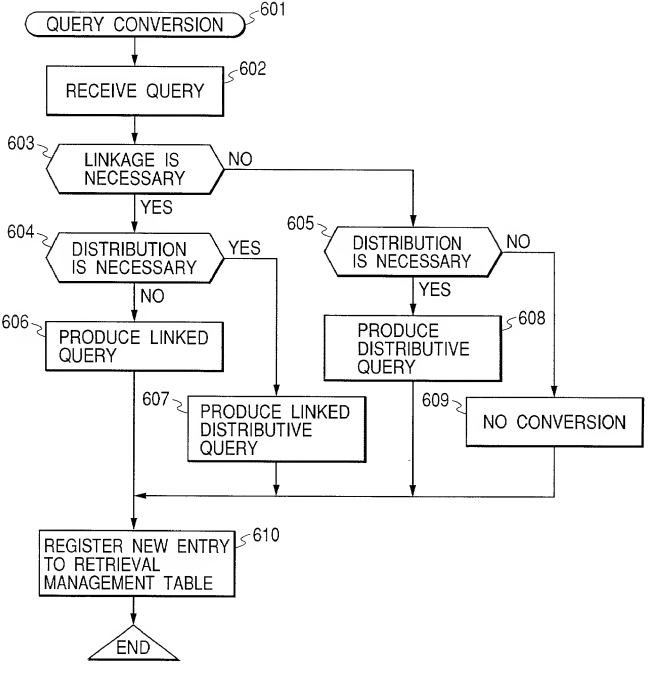

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FIG. 7A

801 SAVING BALANCE TABLE

802 CUSTOMER ID	803 BRANCH	804 SAVING AMOUNT
060001895	SINJUKU	1,050,000
061089288	IKEBUKURO	125,000
060102952	SINJUKU	120,000
----------	-------	-------

FIG. 7B

```
QUERY Q1 :
    SELECT CUSTOMER ID, BRANCH, SAVING AMOUNT
        FROM SAVING BALANCE TABLE
        WHERE SAVING AMOUNT >= 1,000,000 ;
```
805

FIG. 7C

```
QUERY Q2 :
    SELECT CUSTOMER ID, SAVING AMOUNT
        FROM SAVING BALANCE TABLE
        WHERE SAVING AMOUNT <= 10,000 ;
```
806

FIG. 7D

```
LINKED QUERY :
    SELECT CUSTOMER ID, BRANCH, SAVING AMOUNT
        FROM SAVING BALANCE TABLE
        WHERE SAVING AMOUNT >= 1,000,000 OR
        SAVING AMOUNT <= 10,000 ;
```
807

FIG. 7E

```
DISTRIBUTIVE QUERY DQ1 :
    SELECT CUSTOMER ID, BRANCH, SAVING AMOUNT
        FROM SAVING BALANCE TABLE
        WHERE ( SAVING AMOUNT >= 1,000,000 OR
        SAVING AMOUNT <= 10,000 )
        AND BRANCH = ' SINJUKU' ;
```
808

FIG. 7F

```
DISTRIBUTIVE QUERY DQ2 :
    SELECT CUSTOMER ID, BRANCH, SAVING AMOUNT
        FROM SAVING BALANCE TABLE
        WHERE ( SAVING AMOUNT >= 1,000,000 OR
        SAVING AMOUNT <= 10,000 )
        AND BRANCH <> ' SINJUKU' ;
```
809

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FIG. 8

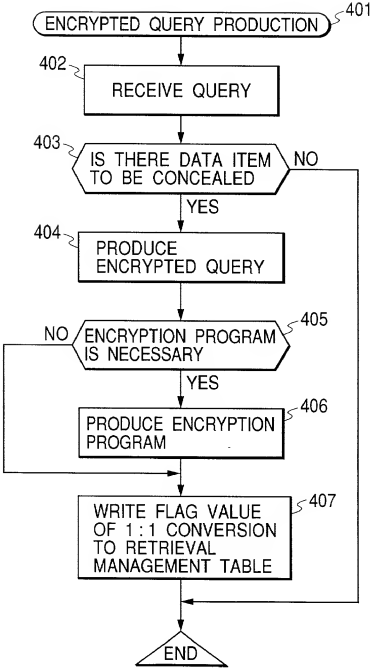

ENCRYPTED QUERY PRODUCTION
401
402
RECEIVE QUERY
403
IS THERE DATA ITEM TO BE CONCEALED
NO
YES
404
PRODUCE ENCRYPTED QUERY
NO
ENCRYPTION PROGRAM IS NECESSARY
405
YES
406
PRODUCE ENCRYPTION PROGRAM
407
WRITE FLAG VALUE OF 1:1 CONVERSION TO RETRIEVAL MANAGEMENT TABLE
END

FIG. 9A

901 GENE ARRANGEMENT TABLE

902 NAME	903 RELATED LINK	904 ARRANGEMENT STRUCTURE
abcd	site A	atcg
efgh	site B	tggctg
ijkl	site C	ccttt
---	---	---

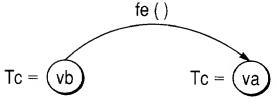
FIG. 9B

```
QUERY Q3 :
  SELECT NAME, RELATED LINK
    FROM GENE ARRANGEMENT TABLE
    WHERE ARRANGEMENT STRUCTURE = ' atcg' ;
```
905

FIG. 9C

```
QUERY Q4 :
  SELECT NAME, RELATED LINK, ARRANGEMENT
  STRUCTURE
    FROM GENE ARRANGEMENT TABLE
    WHERE ARRANGEMENT STRUCTURE = ' @2aSzE' ;
```
906

FIG. 10



Tc : DATA ITEM TO BE CONCEALED
fe ( ) : ENCRYPTION FUNCTION
vb : ORIGINAL DATA VALUE
va : ENCRYPTED DATA VALUE

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FIG. 11

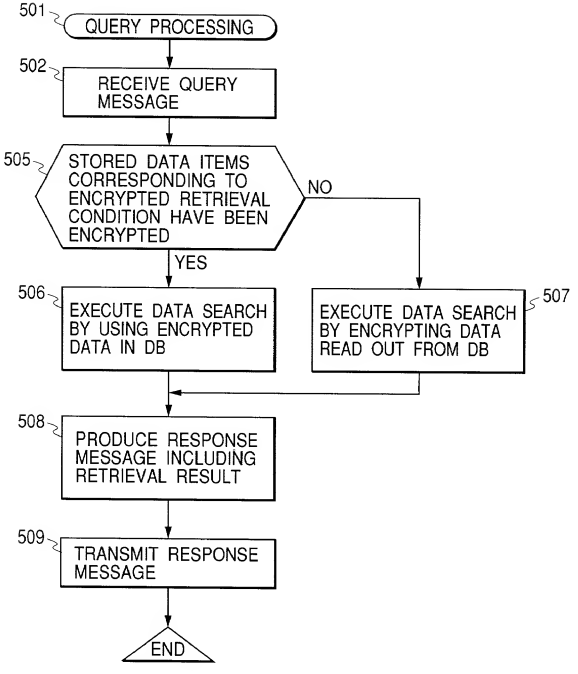
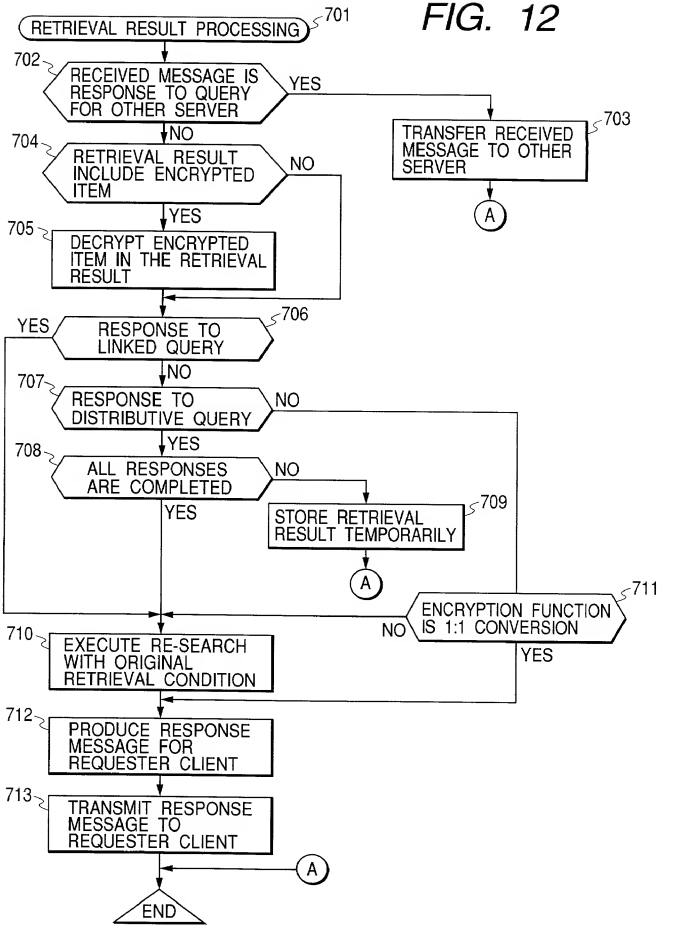

501
QUERY PROCESSING
502
RECEIVE QUERY MESSAGE
505
STORED DATA ITEMS CORRESPONDING TO ENCRYPTED RETRIEVAL CONDITION HAVE BEEN ENCRYPTED
NO
YES
506
EXECUTE DATA SEARCH BY USING ENCRYPTED DATA IN DB
507
EXECUTE DATA SEARCH BY ENCRYPTING DATA READ OUT FROM DB
508
PRODUCE RESPONSE MESSAGE INCLUDING RETRIEVAL RESULT
509
TRANSMIT RESPONSE MESSAGE
END

FIG. 12


RETRIEVAL RESULT PROCESSING
701
702
RECEIVED MESSAGE IS RESPONSE TO QUERY FOR OTHER SERVER
YES
703
TRANSFER RECEIVED MESSAGE TO OTHER SERVER
A
NO
704
RETRIEVAL RESULT INCLUDE ENCRYPTED ITEM
NO
YES
705
DECRYPT ENCRYPTED ITEM IN THE RETRIEVAL RESULT
YES
706
RESPONSE TO LINKED QUERY
NO
707
RESPONSE TO DISTRIBUTIVE QUERY
NO
YES
708
ALL RESPONSES ARE COMPLETED
NO
709
STORE RETRIEVAL RESULT TEMPORARILY
A
YES
711
ENCRYPTION FUNCTION IS 1:1 CONVERSION
NO
YES
710
EXECUTE RE-SEARCH WITH ORIGINAL RETRIEVAL CONDITION
712
PRODUCE RESPONSE MESSAGE FOR REQUESTER CLIENT
713
TRANSMIT RESPONSE MESSAGE TO REQUESTER CLIENT
A
END

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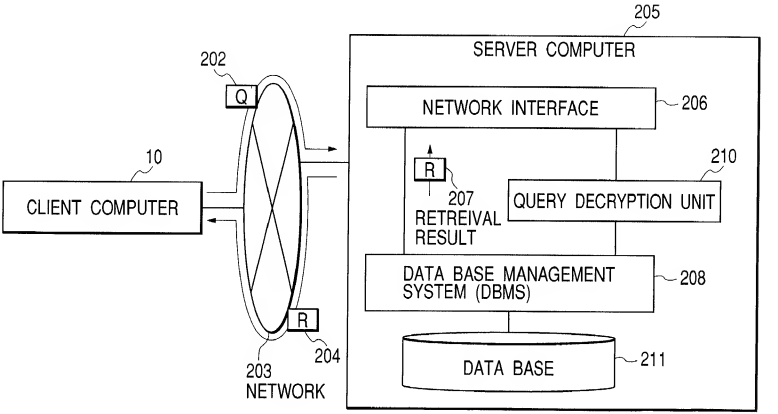
FIG. 13
PRIOR ART